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51
~~75~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50.

52
~~76~~. A seed comprising the isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50.

53
~~77~~. A plant comprising the isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50.

54
~~78~~. The plant of claim ~~77~~ 53, which plant is soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; cabbage; oat; rye; cotton; flax; potato; pine; walnut; citrus; hemp; oak; rice; petunia; orchids; Arabidopsis; broccoli; cauliflower; brussel sprouts; onion; garlic; leek; squash; pumpkin; celery; pea; bean; strawberries; grapes; apples; pears; peaches; banana; palm; cocoa; cucumber; pineapple; apricot; plum; sugar beet; lawn grasses; maple; triticale; safflower; peanut; or olive.

55
~~79~~. The plant of claim ~~77~~ 53, which is soybean.

56
~~80~~. The isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50, which further comprises gag, pol and env genes and which comprises adenine-thymidine-guanidine as the gag gene start codon.

57
~~81~~. The isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50 that further comprises SEQ ID NO:4.

58
~~82~~. A plant cell comprising an isolated nucleic acid molecule of claim ~~81~~ 57.

59
~~83~~. A seed comprising an isolated nucleic acid molecule of claim ~~81~~ 57.

60
~~84~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim ~~80~~ 56.

61 49 50
85. The isolated nucleic acid of claim 73 or 74, wherein said nucleic acid encodes at least a portion of a plant envelope sequence and comprises a nucleic acid sequence selected from the group consisting of:

A2 cont'd

(a) a nucleic acid sequence that has at least 50% identity to SEQ ID NO:5, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:5;

Rule 1.126

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 30% identity to SEQ ID NO:6, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:6; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); and a nucleic acid sequence of (d).

62
86. A plant cell comprising an isolated nucleic acid molecule of claim 61.

63
87. A seed comprising an isolated nucleic acid molecule of claim 61.

64
88. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 61.

65
89. The isolated nucleic acid of claim 49 or 50, wherein said nucleic acid encodes at least a portion of a plant integrase sequence and comprises a nucleic acid sequence selected from the group consisting of:

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:9, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:9;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 75% identity to SEQ ID NO:10, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:10; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

A2 cont'd

66
~~90~~. A plant cell comprising an isolated nucleic acid molecule of claim 65 ~~89~~.

Rule 1.126

67
~~91~~. A seed comprising an isolated nucleic acid molecule of claim 65 ~~89~~.

68
~~92~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 65 ~~89~~.

69
~~93~~. The isolated nucleic acid of claim ~~73~~ 49 or ~~74~~ 50, wherein said nucleic acid molecule encodes at least a portion of a plant reverse transcriptase sequence and comprises a nucleic acid sequence selected from the group consisting of:

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:11, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:11;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 79% identity to SEQ ID NO:12, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:12; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

70
~~94~~. A plant cell comprising an isolated nucleic acid molecule of claim 69 ~~93~~.

71
~~95~~. A seed comprising an isolated nucleic acid molecule of claim 69 ~~93~~.

72
96. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 69.

73
97. The isolated nucleic acid of claim 49 or 50, wherein said nucleic acid molecule encodes at least a portion of a plant RNAseH sequence and comprises a nucleic acid sequence selected from the group consisting of:

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:15, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:15;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 90% identity to SEQ ID NO:16, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:16; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

74
98. A plant cell comprising an isolated nucleic acid molecule of claim 73.

75
99. A seed comprising an isolated nucleic acid molecule of claim 73.

76
100. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 73.

77
101. The isolated nucleic acid of claim 49 or 50, which further encodes at least one agronomically-significant characteristic selected from the group consisting of male sterility, self-incompatibility, foreign organism resistance, an improved biosynthetic pathway, environmental tolerance, a photosynthetic pathway, fruit ripening, oil biosynthesis, pigment biosynthesis, seed formation, starch metabolism, salt tolerance, cold/frost tolerance, drought tolerance, and tolerance to anaerobic conditions.

78
~~102~~. A method to impart agronomically significant characteristics to a plant, comprising contacting the nucleic acid of claim ~~101~~ 77 with at least one plant cell under conditions sufficient to allow said nucleic acid to enter said cell.

A2 cont'd

79
~~103~~. An isolated nucleic acid that encodes a plant retroviral polypurine tract and that comprises SEQ ID NO:3, or a nucleic acid sequence fully complementary to SEQ ID NO:3.

Rule 1.126

80
~~104~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim ~~103~~ 79.

81
~~105~~. A seed comprising the isolated nucleic acid of claim ~~103~~ 79.

82
~~106~~. A plant comprising the isolated nucleic acid of claim ~~103~~ 79.

83
~~107~~. The plant of claim ~~106~~ 82, which plant is soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; cabbage; oat; rye; cotton; flax; potato; pine; walnut; citrus; hemp; oak; rice; petunia; orchids; Arabidopsis; broccoli; cauliflower; brussel sprouts; onion; garlic; leek; squash; pumpkin; celery; pea; bean; strawberries; grapes; apples; pears; peaches; banana; palm; cocoa; cucumber; pineapple; apricot; plum; sugar beet; lawn grasses; maple; triticale; safflower; peanut; or olive.

84
~~108~~. The plant of claim ~~106~~ 82, which is soybean.

85
~~109~~. The isolated nucleic acid of claim ~~103~~ 79, which further comprises gag, pol and env genes and which comprises adenine-thymidine-guanidine as the gag gene start codon.

86
~~110~~. The isolated nucleic acid of claim ~~103~~ 79, which further comprises SEQ ID NO:4.

87
111. A plant cell comprising an isolated nucleic acid molecule of claim 86.

A2 cont'd
88
112. A seed comprising an isolated nucleic acid molecule of claim 86.

89
113. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 86.

90
114. The isolated nucleic acid of claim 79, wherein said nucleic acid encodes at least a portion of a plant envelope sequence and comprises a nucleic acid sequence selected from the group consisting of:

(a) a nucleic acid sequence that has at least 50% identity to SEQ ID NO:5, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:5;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 30% identity to SEQ ID NO:6, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:6; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

91
115. A plant cell comprising an isolated nucleic acid molecule of claim 90.

92
116. A seed comprising an isolated nucleic acid molecule of claim 90.

93
117. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim 90.

94 79
~~118~~. The isolated nucleic acid of claim ~~103~~, wherein said nucleic acid encodes at least a portion of a plant integrase sequence and comprises a nucleic acid sequence selected from the group consisting of:

A2 cont'd

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:9, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:9;

Rule 1.126

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 75% identity to SEQ ID NO:10, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:10; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

95
~~119~~. A plant cell comprising an isolated nucleic acid molecule of claim ~~118~~. 94

96
~~120~~. A seed comprising an isolated nucleic acid molecule of claim ~~118~~. 94

97
~~121~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim ~~118~~. 94

98
~~122~~. The isolated nucleic acid of claim ~~103~~, wherein said nucleic acid molecule encodes at least a portion of a plant reverse transcriptase sequence and comprises a nucleic acid sequence selected from the group consisting of: 79

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:11, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:11;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 79% identity to SEQ ID NO:12, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:12; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

A2 cont'd

99 98
~~123~~. A plant cell comprising an isolated nucleic acid molecule of claim ~~122~~.

Rule 1.126

100 98
~~124~~. A seed comprising an isolated nucleic acid molecule of claim ~~122~~.

101 98
~~125~~. A vector that can transfer a nucleic acid to a plant cell comprising the isolated nucleic acid of claim ~~122~~.

102 79
~~126~~. The isolated nucleic acid of claim ~~103~~, wherein said nucleic acid molecule encodes at least a portion of a plant RNAseH sequence and comprises a nucleic acid sequence selected from the group consisting of:

(a) a nucleic acid sequence that has at least 70% identity to SEQ ID NO:15, wherein said identity can be determined using the DNAsis computer program and default parameters;

(b) a nucleic acid sequence having SEQ ID NO:15;

(c) a nucleic acid sequence that encodes an amino acid sequence that has at least 90% identity to SEQ ID NO:16, wherein said identity can be determined using the DNAsis computer program and default parameters;

(d) a nucleic acid sequence that encodes amino acid sequence SEQ ID NO:16; and

(e) a nucleic acid sequence fully complementary to a nucleic acid sequence selected from the group consisting of: a nucleic acid sequence of (a); a nucleic acid sequence of (b); a nucleic acid sequence of (c); a nucleic acid sequence of (d); and a nucleic acid sequence of (e).

103 102
~~127~~. A plant cell comprising an isolated nucleic acid molecule of claim ~~126~~.

104 102
~~128~~. A seed comprising an isolated nucleic acid molecule of claim ~~126~~.